Rock Chips
Spring 2005

Alberta Geological Survey Celebrates 85th Anniversary

First Alberta geological field party in 1921 near the Drumheller area.

This year, the Alberta Geological Survey (AGS) celebrates its 85th anniversary. The actual date is hard to pin down, but we at AGS use 1920 as the birth year. That year marked the release of the "First Annual Report on the Mineral Resources of Alberta," authored by Dr. John Allan, for whom Mt. Allan in Kananaskis Country is now named. This special anniversary edition of Rock Chips celebrates the history of the Alberta Geological Survey from Dr. Allan's first report to the Legislative Assembly of Alberta to the modern AGS as part of the Alberta Energy and Utilities Board.

The roots of the AGS go back to 1912, one year after the founding of the University of Alberta. Dr. Henry Marshall Tory, then president of the university, appointed Dr. John Allan to initiate the teaching of geology and establish a new Geology Department at the U of A. Dr. Allan took up the challenge and stayed on as Professor of Geology for nearly 40 years, with 37 of those years as head of the Geology Department.

In 1920, Dr. Allan delivered to the Legislative Assembly of Alberta the first government report on the mineral resources of the Province. Dr. Allan reported on 18 different mineral resources known to occur in the province at that time. That report marks the beginning of the Alberta Geological Survey.

Prompted by Dr. Allan's report and growing public interest in developing Alberta's mineral and bitumen resources, the Alberta government formed the Scientific and Industrial Research Council of Alberta, or SIRCA, in 1921. SIRCA, located on the campus of the University of Alberta, was the forerunner to the present Alberta Research Council. SIRCA's mission was to support economic development in Alberta through the application of scientific and engineering expertise. This mission included the geological survey function and Dr. Allan was cross-appointed to SIRCA.

In 1924, Dr. Ralph Rutherford joined SIRCA as their first full-time geologist. Dr. Rutherford had previously worked as a field assistant to Dr. Allan in 1917. Together, Drs. Allan and Rutherford became responsible for the geological study of the entire province. Much of Dr. Rutherford's field research in the early years focused on interpreting the structure and subsurface geology of the Alberta foothills and adjoining plains. This work led to a better understanding of Alberta's foothills coal deposits. It also greatly assisted exploration for oil and gas in Alberta's oil boom a few years later.

Dr. Rutherford also lectured at the University of Alberta during the 1920s and, when SIRCA funding decreased during the Depression, he joined the Department of Geology at the U of A as a full-time professor. During the 1930s, Drs. Allan and Rutherford continued to work on the geology of Alberta. They extensively surveyed Alberta's coal resources at a time when energy costs were only 3 cents a gigajoule. The first Geological Map of Alberta was completed by Dr. Allan in 1937 and was sold for 75 cents. Dr. Allan's map has stood the test of time and is markedly similar to the Geological Map of

EUB Alberta Energy and Utilities Board
AGS

Alberta maintained by the AGS today.
In the 1940s, prosperity returned and full-time geologists were again employed at the Research Council of Alberta (formerly SIRCA). The first of this new wave of survey geologists included Michael Crawford, John Carr and W. Clow under the steady leadership of Dr. Allan, who retired from leading the Geology Division in 1949. In recognition of his enormous contributions to Alberta, a mountain in Kananaskis Country was named for him in 1948 by M.B.B. Crockford.

With the discovery of oil at Leduc in 1947, Alberta changed forever. Funding for geological studies began to flow into the Research Council of Alberta (now Alberta Research Council - ARC). There was much research and survey work to be done after the lean years of the Depression and World War II. The government had money and the need to construct roads, but the supply of gravel was unknown. Growing towns needed water, but groundwater supplies were poorly known. There was again growing interest in developing Alberta's immense oil sands deposits. All of these areas required the skill of the Council's geologists.

By 1956, the Research Council of Alberta had opened new laboratories and started an experimental pilot plant for bitumen research. There were now 15 geologists employed in a variety of disciplines. In 1955, a groundwater program was initiated and staff were hired to work on problems of rural water supply. This marked the beginnings of a series of groundwater and basin-analysis programs that continue today at the Alberta Geological Survey, including a 20-year program in the 1960s and 1970s that resulted in the internationally renowned groundwater reconnaissance map series of Alberta.

The 1960s saw even more growth in Alberta's oil business, and geologists recognized the ongoing need to improve on our basic understanding of the geology of the province. For example, the Geology Division resumed mapping the surficial and bedrock geology of the province to fill in the gaps on Allan's 1937 map. Likewise, studies of the Precambrian Shield in northeastern Alberta and the Clear Hills iron deposit in northwestern Alberta began. These efforts continue today at the AGS in response to the need for more geoscience knowledge to support economic development of Alberta's north.

The 1970s saw renewed interest in the geology of industrial minerals, aggregate and the oil sands areas

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of Alberta. New projects in environmental geology and the geology of Alberta's urban areas were also initiated. Drilling projects evaluated the deep coal resources of the Alberta Plains, creating a legacy of borehole records and reports that are often used today to assist the development of Alberta's coalbed methane resources.

Studies on all aspects of Alberta's geology continued throughout the 1980s, but the landmark contribution of the AGS during this decade was a series of extensive reports performed on behalf of and released by the Alberta Oil Sands Technology and Research Authority (AOSTRA) on the geology of Alberta's oil sands and heavy oil deposits. During this decade, and continuing into the next one, AGS pursued a program in Basin Analysis that led to understanding of the hydrogeology of the deep sedimentary strata in the Alberta Basin. The AGS also began to embrace technology and computers in the 1980s, becoming a leader in computer-based mapping techniques and data storage and retrieval systems in geological applications. As well, the AGS continued its tradition in applied studies in earth resources, looking at diverse issues like soil salinity and highwall stability in open-pit coal mines. The first potential diamond-bearing rocks, known as kimberlites, were identified in Alberta in 1989, setting the stage for future AGS programs and an unprecedented mineral exploration boom in the next decade.

The 1990s were a time of great change driven by government prioritization and reorganization. The Alberta Research Council shifted its focus from natural resources to technology development, and as a result, AGS was transferred as a unit to the Alberta Ministry of Energy, first to the Department of Energy in 1995, and then, within the ministry, to the Alberta Energy and Utilities Board (EUB) in 1996.

Even through these changing and challenging times during the 1990s, the AGS still made several significant contributions. For example, the co-publication of the Geological Atlas of the Western Canada Sedimentary Basin with the Canadian Society of Petroleum Geologists in 1994 gave Albertans a geological atlas of their home province that is unprecedented in its detail, quality and beauty. A geological atlas of this depth and breadth will not likely be done again for many years. But when the time comes to update it, the AGS will be ready.

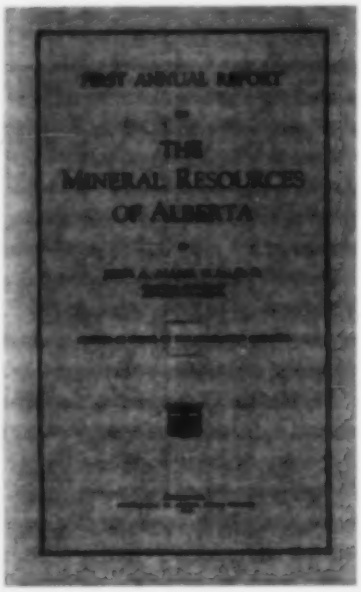
The past five years from 2000 to 2005 have been characterized by stability and even growth. Staff numbers have increased once more and the AGS has been successfully integrating itself into the business of the EUB without loss of its identity or mission. The pace of technological change actually increased during the 1980s and 1990s, creating new challenges and stresses. Now geologists routinely use databases and geographic information systems (GIS), which were the realm of specialists a few short years ago, on computers that can outperform the room-sized mainframes of yesterday.

The needs of Alberta as a province are always changing and as a result so too must the Alberta Geological Survey. Our programs and structure in 2005 closely reflect the immediate business goals of the Government of Alberta and the EUB in the development of the province's energy, mineral and groundwater resources. Yet, at the same time, we continue to look ahead to the future geoscience needs of Albertans, just like Allan and Rutherford did. Our portfolio of projects and activities still includes surficial and bedrock geology, industrial minerals, iron and other metals, groundwater, coal, geohazards and oil sands. In this way, we have not changed that much since the days of Allan and Rutherford. To this list of AGS activities we have also added projects in greenhouse and acid gas management, coalbed methane, diamonds, geochemistry, deep-living bacteria and uranium - things that Dr. Allan could scarcely have imagined. But we think he would have approved. We are looking forward to the next 85 years to the last decade of this century.

The following pages outline achievements and photos over the past 85 years. These highlights have been collected from former and current staff, publications and photo collections. Where possible we have tried to identify the people in the photographs. Unless otherwise noted, the photos are from the Alberta Geological Survey's archive photo collection. The first reports are referenced as an Alberta Research Council (ARC) report number, as they were published while AGS was part of the ARC and its predecessors. These reports are now available (unless they are out of print) through the EUB/AGS Information Sales office. We hope that you enjoy this tour through our past. ❖

1920s

1920 First Annual Report on the Mineral Resources of Alberta is published by Dr. John Allan.



1921 The Scientific and Industrial Research Council of Alberta is established and the Geological Survey is a founding part of the Council.

1921 First AGS field party is active in the Drumheller area and works in cooperation with a University of Alberta team searching for dinosaur remains.

Members of the first AGS field party making observations along the Red Deer River near Drumheller.

1921 Experiments begin on extracting crude oil from tar sands by heating. This process is later refined by Karl A. Clark who patented the hot water extraction process for separating oil from oil sands.

1922 ARC Report #4 entitled Geology of Drumheller Coal Field, Alberta, is released.

1923 ARC Report #6, entitled Saunders Creek and Nordegg Coal Basins, Alberta, Canada, is released.

Upper Saunders Formation one mile east of Ancona (photograph from ARC Report #6).

Outcrop of a coal seam in the Nordegg River at the mouth of Colt Creek (photograph from ARC Report #6).

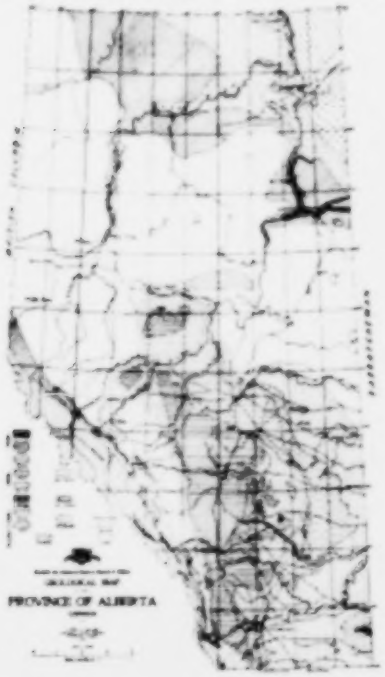
John Allan and Ralph Rutherford doing fieldwork (photo from the University of Alberta archives).

1924 Dr. Ralph Rutherford joins the Geology Division of SIRCA as a full-time geologist after working as a temporary field geologist in 1917 with Dr. Allan. The two are now responsible for surveying the entire province of Alberta.

1925 First map showing Alberta coal fields is produced.

ARC Report #11, Geology of the Foothills Belt Between McLeod and Athabasca Rivers Alberta, is published. This report is a milestone for understanding this region's geology and mineral resources.

1926 First Geological Map of Alberta is published.



1929 ARC Report #18, The Bituminous Sands of Alberta, by K.A. Clark, is published. The report is in three parts, comprising the bitumen occurrence, separation of bitumen from sand and the study of the commercial possibilities of various uses for bituminous sand.

The hot water extraction plant that was designed by Karl A. Clark and located on the banks of the Clearwater River, east of Fort McMurray. Test runs of bituminous sand were processed here. The plant operated during the summer of 1930.

A sketch map of North America showing the locations of known oil fields (Figure 1 in ARC Report 18).

1930s

1930 ARC Report #21, Geology and Water Resources in Parts of the Peace River and Grande Prairie Districts, Alberta, is published. The report is authored by R. Rutherford with the appendix by P.S. Warren. This is Alberta's first groundwater study.

1931 The Geological Division of Research Council of Alberta completes a geological investigation of Alberta's land surface; 14% of the province is now mapped.

Investigations into building stone, Burmis iron ore and Jasper Park gypsum are done.

Long term oil sands and coal classification projects are abandoned. A small group of senior scientists are retained and double as professors at the University of Alberta.

1934 The Geological Map of Central Alberta is published in colour and is part of Report #30, Geology of Central Alberta, by J. Allan and R. Rutherford.

1940s

1942 Funding resumes and new researchers are hired.

1947 Oil is discovered at the Leduc #1 well.

R. Rutherford cooking a meal on a gas flare at Pakan, east of Redwater in 1917. His geological research eventually led to the discovery of oil at Leduc.

Leduc #1 flowing oil (photo from University of Alberta archives).

1948 The Geological Division expands to include investigations of clay, water and sand resources. Work also continues on coal and iron studies.

1950s

1952 An exploratory soil survey program is started to outline areas suitable for future agricultural development and for the planning of roads. It covers about 1.15 million acres by means of pack horses. At the same time, a study of the surficial geology of the same areas is made.

A geological field party in the Alberta Foothills (1952).

1953 The Peace River oolitic ironstone, which was first discovered in 1924, is "rediscovered" and a new study begins. This work continues into the 1970s.

Map showing known iron occurrences in the Peace River region. The map is taken from ARC Earth Sciences Report 59-03.

1955 Commencement of the groundwater research program. The program is set up to deal with an increasing number of requests for information about, and assistance with, groundwater related topics.

Helicopters are used for the first time for exploratory soil surveying and the study of surficial geology. This proves to be an excellent way of making a rapid preliminary inspection of large areas in remote regions of Alberta.

Lou Bayrock begins surficial geology studies throughout the province, which leads to reports and maps being produced throughout the '50s, '60s and '70s.

1956 New labs are opened and there are now 15 geologists working in a variety of disciplines at the ARC.

The first three groundwater observation-wells are drilled and equipped with automatic water-level recorders. This begins the Groundwater Observation-Well Network at ARC.

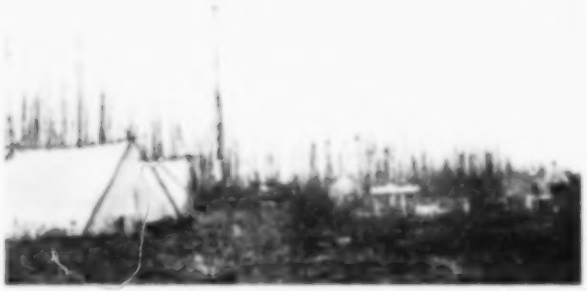
1958 A 0.83 carat clear octahedral diamond is discovered by Einar Opdahl in the Evansburg area (northwest-central Alberta).

Dr. Lou Bayrock.

Bell helicopter used during field work.

Glacier studies supported work on Alberta glacial sediment.

Soil sampling on a regular grid.



Campsite with the cook tent/office/storage on the left and helicopter landing pad on the right. The AGS still has one of these tents in storage.

Tom Berg surveying.

Detailed geological mapping of the Precambrian Shield in northeastern Alberta is started by John Godfrey. His studies continue until 1985. Samples from this study were used during the Canada-Alberta Partnership on Minerals project in the 1990s and were said to represent the best mapping and sampling of the Precambrian Shield anywhere in the world.

Part of the collection of Precambrian Shield samples collected by John Godfrey that are now stored at the AGS Mineral Core Research Facility (MCRF).

Close-up of some of the rock samples taken and recorded by John Godfrey from the Precambrian Shield.

1960s

1960 It is anticipated that knowledge of the morphology and origin of some of the major land forms and structural features found in Alberta will aid in the exploration of Alberta's natural resources. As a result, ARC Bulletin 5, Air Photographs of Alberta, gives a more complete coverage of the Plains region than its predecessor and is strengthened by the addition of photographs from the mountains and Precambrian shield.

Geological projects include the study of iron deposits, examination of a gypsum deposit at Mount Head and preparation of a report on the four known gypsum deposits in Alberta. Work on the improvement of the grade of surface sands is also initiated.

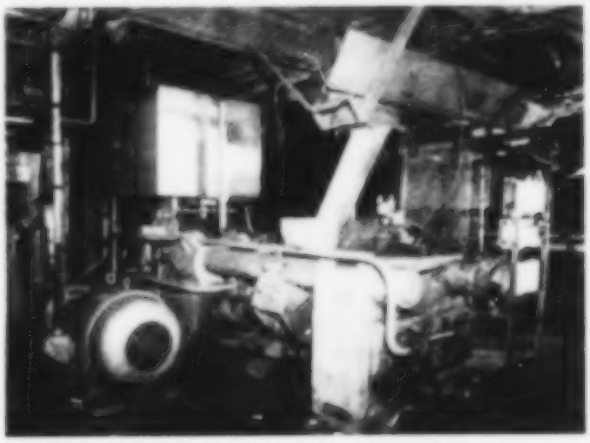
Lunch break during field mapping in northeastern Alberta.

Glacial geology information is obtained during the exploratory helicopter soil survey in the northwestern part of the province.

An extractive metallurgical program is initiated to develop techniques to produce high purity iron powders from the iron deposits found in the Clear Hills area of northwestern Alberta.

1961 Geological work on the iron deposits of Alberta is continued with emphasis on the mineralogy and metallurgy of the Clear Hills iron resource.

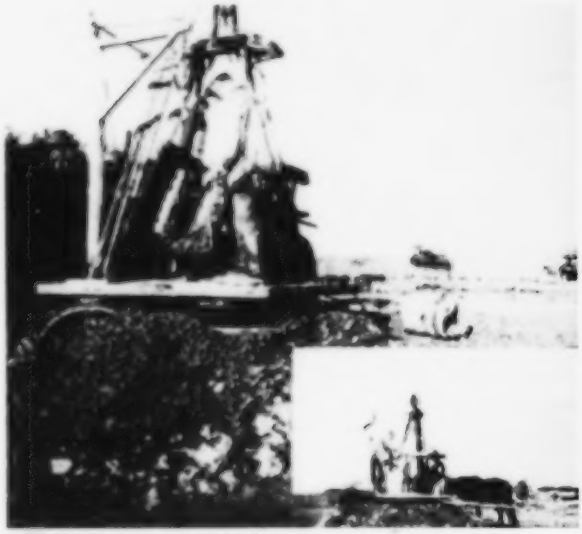
An acid leach process for production of high-purity iron powders from the low-grade iron deposits in the Clear Hills is developed. A small pilot plant is started to test this new technique.



Concentrate briquetting press (photo from ARC INF 40).

Briquettes (photo from ARC INF 40).

The groundwater observation-well program is extended to cover all of the populated parts of the province. Special attention was given to the exploration and development of groundwater supplies found in gravel-filled buried channels and in sands and gravels adjacent to major rivers.



The old customary practice of searching for groundwater supplies using a horse-drawn boring rig is gradually replaced by a modern process using a hydraulic rotary well-drilling rig as seen in the picture below (photos from ARC Bulletin 13).

Increasing realization of the importance of coal as a fuel for new thermal power plants indicated a need for a comprehensive program to delineate major coal deposits amenable to strip mining. As a result, coal research activities are enlarged.

1962 The pilot plant for the acid leach process in the production of iron powders is completed.

1963 A collection of papers on the Athabasca Oil Sands is presented to Dr. Karl Clark on his 75th birthday. It is released as ARC Information Series 45.

D.S. Pasternack and K.A. Clark working on a tar sands experimental plant in 1949. This work led to the collection of papers presented to Dr. Clark in 1963.

1965 The first major placer gold report is issued as ARC Open File Report 1965-11. The title was The Occurrence of Gold in Alberta Rivers.

1968 Construction of the first in situ oil sands recovery simulator based on Dr. Karl Clark's water process begins.

August 1968, excavating stone polygons at Plateau Mountain, Alberta. Left to right are Tom Berg, Lou Bayrock and summer staff Ted Reimchen and Ernie Tchir (photograph from Dr. Robert Green).

1969 Completion of soil surveying of the major agricultural areas. This led to the classification of agricultural and forestry regions of Alberta.

The Groundwater Division implements a new storage and retrieval system, the Central Data File (CDF). It is a hardcopy system that keeps all records pertinent to wells, springs, test holes, etc. It would be transferred to Alberta Environment in the early 1980s.

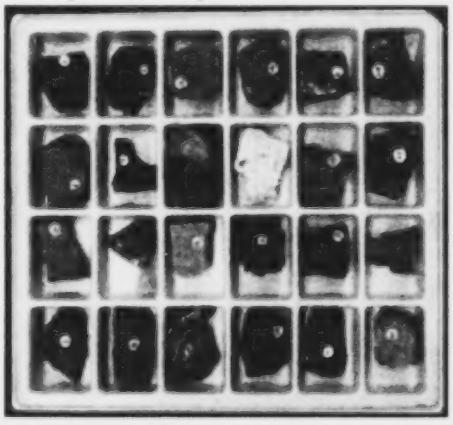
The study of the potential for metallic mineral-bearing Precambrian rocks of northeastern Alberta continues with financial support from the Northern Alberta Development Council.

1970s

1970 The Alberta Geological Survey celebrates its 50th anniversary.

A series of hydrogeological Earth Sciences Reports that would produce reports/maps for the entire province is initiated.

A limited program in the field of educational geology is started. The project offered sample sets of common Alberta rocks for use in the earth sciences section of the Alberta high school curriculum. Twelve hundred pounds of rock were collected from 24 localities in various parts of Alberta. The Sheltered Workshop society processed, packaged and shipped the rock specimens to purchasers.



The rock set was accompanied by a booklet and map noting where each rock specimen came from.

The Bedrock Geology Map of Northern Alberta is published (ARC Map 24).

1971 Increasing emphasis is now being given to studies directly concerned with environmental planning and control, and to the education-recreational requirements of the populace. Some of these studies are the urban geology of the greater Edmonton area, geology of the Peace-Athabasca delta complex, surface mine reclamation studies, and a study of the Great Divide Trail.

1972 Surficial Geology of Edmonton, NTS 83H is published. This map is one of a series of surficial geology maps published at a scale of 1:250 000 throughout the '70s and '80s.

A new Geological Map of Alberta (see below) is published. The geology is compiled by Dr. R. Green and the geological cartography is done by F.L. Copeland.

Activities in the field of oil sands exploration and development are renewed. New projects concern detailed analysis of potential metallic mineral by-products obtained from oil sands deposits, and surficial deposits mapping in the Fort McMurray area.

A detailed survey of potential quarry sites for granite building stone near Fort Chipewyan is done.

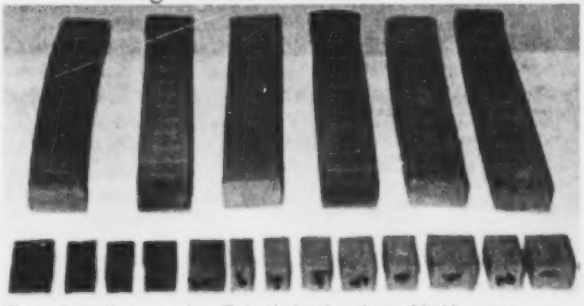
Ron May cutting a pad to allow a second helicopter to land after the blade tips on the original one struck small trees and broke. Everyone landed safely.

1973 A comprehensive program is initiated for testing the ceramic properties of Alberta clays and shales. Results of this program are published in ARC Economic Geology Report 7, The Ceramic Potential of Alberta Clays and Shales.

1974 Work is done to further develop the Alberta Plains Coal Resource Inventory.

Economic studies for bentonite, gypsum, limestone and dolomite, clay and shale, silica sand and sandstone continue. In the following years Economic Geology Reports are completed for these resources.

A fourth laboratory for ceramic testing is now operational and for the first time more than 1000 X-ray patterns were obtained during the year; 37 per cent of these were from samples relating to oil sands research.



Ceramic testing samples. Extruded or hand-moulded bars are prepared and fired. The drying properties, firing range, firing shrinkage, colour, steel hardness and cold water absorption are determined.

A project to investigate the regional hydrogeology of the Athabasca Oil Sands is started. The purpose of the study is to develop a hydrogeological model of the area for technical and environmental planning.

Site number three of the Athabasca Oil Sands observation wells.

1976 An aggregate-inventory project to evaluate the gravel and sand resources of the province, and to provide data for long-term planning and land use, is initiated. Within three months, information from this project was contributed to the Eastern Slopes Planning Project of the Rocky Mountains and to the Calgary Regional Planning Commission.

Dixon Edwards (right) and Julian Fox in the field working on the aggregate inventory project.

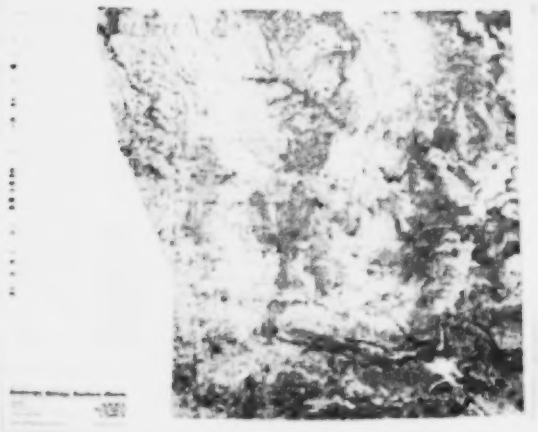
A province-wide review of springs in Alberta is started based on existing information supplemented by limited field studies. Data from this project would be later published in ARC Earth Sciences Report 82-03, Springs of Alberta.

Recognizing the problem of acidic soils in Alberta, the Department of Agriculture commissioned the Survey to explore for and evaluate marl and tufa deposits as possible sources of agricultural lime. ARC Earth Sciences Report 82-01, Marl Resources of Alberta would be later published in 1982.

1977 Work begins on a project to outline the deeper coal resources of parts of the Alberta Plains. Ninety holes totalling 19 000 m are drilled. Samples and some core are collected and geophysical logs are run.

Following a policy change by the Department of Energy and Natural Resources, mineral assessment reports are now made available for public distribution.

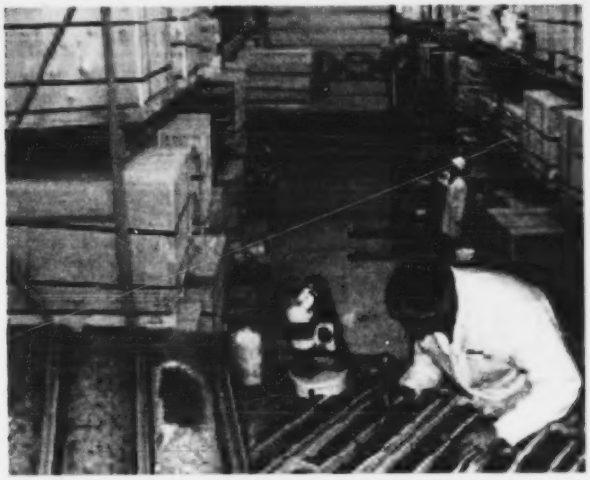
1979 A 1:1 000 000 scale map of the Quaternary geology of southern Alberta is started. It would later be published as ARC Map 207 (see below).



There is an intensification of coal research, with the major focus on the conversion of coal to liquid fuels, combustion and gasification properties of Alberta coals and coal-oil agglomeration for coal transportation and cleaning.

A diamond drill-core selection and storage program is started by the Department of Energy and Natural Resources. The submission of core drilled during exploration for metallic or industrial minerals is required by the Metallic and Industrial Mineral Regulations. The AGS is contracted to prepare a facility to store and manage the core and to select core and samples on behalf of the Department. It is called MESS (Mineral Exploration Core and Sample Storage). In the early 1980s, a research component is added to the function and the facility becomes known as the Mineral Core

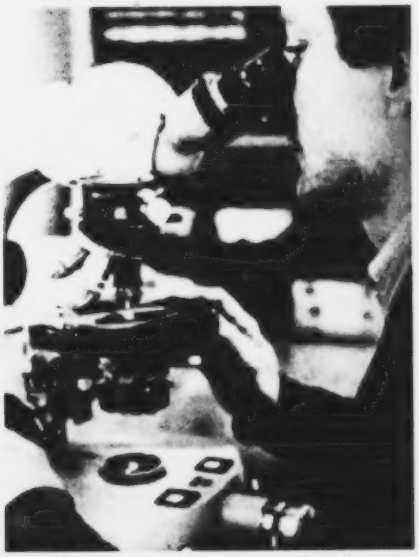
Research Facility (MCRF). Oil sands core is also now stored at the MCRF.



The annual contract for working on the aggregate inventory is modified to five-year contracts.

1980s

1980 Major geological investigations in all of Alberta's oil sands and heavy oil deposits are initiated. Six projects will provide basic geological information on a deposit-wide scale for government and industry to use in developing in situ extraction techniques.



Examination of thin sections of material through a microscope is a major element of the oil sands studies (Grant Mossop at the microscope).

A buried erratic of McMurray Formation oil sand in the Edmonton area is discovered. This giant mass of bedrock was transported from its source by glacial movement over a distance of about 350 kilometres.

Subsurface evaluation of the Carbon-Thompson coal zone of the Red Deer area is completed. Detailed facies studies of the coal resources of the Horseshoe Canyon Formation of central Alberta and of the Ardley Coal Zone are begun.

AGS moves out of the University of Alberta campus to a new location in south Edmonton.

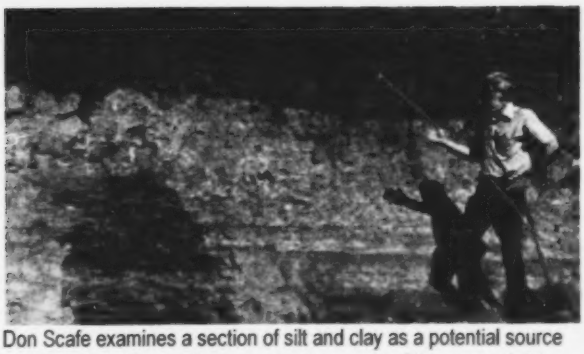
1981 Using Alberta Energy Resources Conservation Board data on the Athabasca oil sands deposit, AGS staff develop a computer mapping technique to convert this information to regional maps for further definition and understanding of the deposit.

Groundwater inventory studies are completed, marking the end of an era of groundwater research dominated by regional studies.

A program called GEODIAL is initiated and an Information Geologist is hired to answer geological inquiries.

The aggregate inventory grows to include an assessment of expandible clay, phosphate and limestone resources.

Dixon Edwards taking a ground-level reading with an EM-31 resistivity unit.



Don Scafe examines a section of silt and clay as a potential source of raw material for synthetic aggregate as part of the research into alternate aggregate resources.

1983 Detailed 1:50 000-scale mapping of sand and gravel ends due to a decrease in funding. Sales of Open File Maps on aggregate resources reaches 10 000 copies and 18% of Alberta has been geologically mapped at a cost of approximately $3 million (Cdn., 1983).

Coal geology studies are concentrated in the Alberta plains. Emphasis is on the nature and origin of coal seams at comparatively shallow depths with potential for shallow mining or in situ conversion.

Some surface coal mines in Alberta have experienced serious instability of highwalls, threatening the safety of mine workers and equipment. Geologists begin working toward the advance detection of these hazards. They use several techniques, including air photography, surface geophysical techniques, and drilling and downhole geophysics, which are less expensive than oriented, rotary coring.

Members of the Highwall Stability Project (left to right, Mark Fenton, Caroline Jones and John Pawlowicz) at the Highvale coal mine.

The preliminary province-wide inventory of all of Alberta's important mineral resources is completed. With the completion of the Alberta phosphate survey, the inventory of Alberta's ceramic clays, and the Athabasca Basin uranium study, virtually all of the known potentially important mineral commodities in the province except sand and gravel have been characterized and mapped at reconnaissance scales. This work was done over a period of 17 years and involved some 74 person-years of research.

The Aggregate Inventory Project is broadened in scope to include the capturing of data on gold concentrations in modern alluvial sediments, and in sands and gravels deposited by rivers in the last million years. This study is due to increased interest in gold, spurred by high prices.

Reconnaissance mapping at a scale of 1:250 000 for sand and gravel resumes. Another 35% of the province is completed for approximately $1 million (Cdn., 1990). External funding for the project ceases in 1990. Sales of the maps reach 15 000.

1984 The first proposal to pursue the Canada-Alberta Partnership on Minerals (MDA) to support research that can help identify and assess Alberta's mineral potential is submitted to the Department of Energy and Natural Resources.

ARC Bulletin 46, Oil Sands Geology-Athabasca Deposit North is published. It is the first major publication on the Alberta Oil Sands.

1985 The first part of a study on the potential uranium deposits in the Athabasca Basin is completed using geological data at the Mineral Core Research Facility.

John Wilson studying rock samples at the Mineral Core Research Facility.

The four main research groups at the AGS are Basin Analysis, Coal Geology, Mineral Resources and Oil Sands Geology.

A new Computing Geology Group is formed.

A proposal is put forward to compile and produce a new atlas of the subsurface geology of the Western Canada Sedimentary Basin, as a co-operative venture involving input from numerous institutions and individual geologists in western Canada. Funding and commitments would be secured in 1986.

The first major commodity analysis is completed under special funding from the Department of Energy and Natural Resources and is published as ARC Bulletin 47, Aggregate Resources of the Edmonton/Lloydminster Region.

1986 Reports on the geology and resources of the Ardley Coal Zone, Horseshoe Canyon Formation and Belly River Group in the plains area mark the completion of the Plains coal study. A new contract is given for the study of coal over the next three years.

Left to right, Rick Richardson, Willem Langenberg and Peter McCabe discussing the rocks underlying the major coal seams in the Grande Cache area.

A project is initiated to map, inventory and evaluate the non-fuel mineral resources of Alberta and to maintain a current inventory of mineral deposits and assessments of resource potential for industrial and metallic minerals. This information would be put into a systematic database called the Alberta Mineral Deposits and Occurences (AMD/O) file.

Building on the strength of the program in oil sands geology developed in the first part of the decade, AGS enters into a five-year contract with the Alberta Oil Sands Technology and Research Authority (AOTRA) and the Alberta Department of Energy to support the development of this important energy resource in the province. The program, which will continue into the early 1990s, has three components: Regional-Scale Mapping of the Athabasca Oil Sands Deposit; Reservoir Analysis, and geoscience support to AOSTRA's Underground Test Facility (UTF) north of Fort McMurray that has applied and demonstrated the Steam Assisted Gravity Drainage (SAGD) process that is now used for in situ production of bitumen from oil sands. This work established the geological framework underpinning the massive oilsands industry expansion today.

With funding from the Alberta Environment, projects are started to provide an answer to environmental and water resources management concerns regarding the effects of deep injection of liquid waste at the Swan Hills facility and of residual water from the in situ oil sands recovery activity in the Cold Lake area. These studies constitute the beginning of a program more than a decade long in understanding the chemistry and flow of formation waters in the Alberta Basin. This work is presented in ARC Bulletins 58, 59 and 60.

1987 Map 207, Quaternary Geology, Southern Alberta is, published.

1988 The Basin Analysis Group focuses on two main projects. The Peace River Arch study involving the interpretation, on a regional basis, of the sedimentology, stratigraphy and hydrogeology of the basin in the arch area, and a better understanding of the influence of structure on hydrocarbon generation and accumulation is developed. The other project is the Geological Atlas of the Western Canada Sedimentary Basin. Both projects, led by AGS staff, are executed with extensive collaboration from researchers and professionals from the Geological Survey of Canada, universities and industry.

Soil salinity research is undertaken to identify and rectify practices that may be contributing to the increase in salinized acreage. At several sites in east-central and southern Alberta, research is proceeding to establish the link between upland sources of groundwater recharge and soil salinity in lower-slope positions.

Laurence Andriashek and Steve Moran measure the thickness of beds in the Belly River sandstone.

Richard Stein sampling evaporative salts.

Summer student Barry Fildes working on a limestone assessment project in the Cline River area.

1989 Monopros identified the Mountain Lake area west of Valleyview, Alberta, as prospective for kimberlitic diatremes. Samples are stored at the MCRF on a confidential basis.

Members of the Coal Project. Left to right are Rudy Strobl, Gregory Mandryk, Carolyn Sterenberg, Rick Richardson and Willem Langenberg.

Members of the Minerals group, from left to right, are Doug Boisvert, Monica Price, Dixon Edwards, Don Scafe and Wylie Hamilton.

Left to right are Joseph MacGillivray, Campbell Kidston and Mike Berhane working on log analysis.

Tim Berezniuk examining geophysical logs.

John Kramers working on oil sands reservoir analysis.

Left to right are Stefan Bachu, Michel Brulotte, Jim Undershultz and Mika Madunicky working on a Basin Analysis project.

1990s

1990 The Alberta Geological Survey is co-managed by the Alberta Department of Energy and the Alberta Research Council.

The Peace River Arch project is completed. This study investigated the geological setting, history and hydrogeology of the region extending across northwestern Alberta into British Columbia. The results are published in a special volume (38A) of the Bulletin of Canadian Petroleum Geology.

Map 213, Quaternary Geology, Central Alberta, is released.

Coalbed methane as a potential resource had only been recognized within the last several years, and much of the geoscience community had only limited knowledge of the resource. To aid in the transfer of information/technology, a 'seminar series' was initiated that included seminars, workshops, short courses and field trips on related technical topics.

The second major placer gold report is issued. It is Open File Report 1990-09, Placer Gold Occurrences in Alberta.

1991 The use of cost-effective Geographic Information System (GIS) technology allows the coal database and various thematic maps to be analysed, updated and displayed with complete flexibility at any scale.

Dennis Chao working with the GIS system for coal compilation maps.

The AMD/O database is released as Open File Report 1991-17. The file contained data on known deposits and occurrences of potential economic minerals in Alberta. It was created by the Minerals and Coal Geoscience Section of the AGS.

With support from Environment Canada, hydrogeologists at AGS study the hydrogeology of the Athabasca Oil Sands Deposit (ARC Bulletin #61 Regional-Scale Subsurface Hydrogeology in Northeast Alberta). This work will prove later in the decade to be essential in hearings at EUB with regard to the effect of gas production on bitumen recovery by steam assisted gravity drainage in the Athabasca area.

The MCRF moves to a new and larger building at 4504 Eleniak Road.

Darell Cotterill (left) and Doug Boisvert viewing core at the new MCRF location.

1992 The Canada-Alberta Partnership on Minerals (MDA) agreement is signed. It is a three-year funding program jointly administered by the federal and Alberta governments. Its purpose is to support research that can help identify and assess Alberta's mineral potential, leading to responsible mineral exploration and development.

The Industrial Minerals Forum is held in Banff for only the second time in Canada.

A Diamond Exploration Information Hotline is established to assist industry in diamond exploration.

Wylie Hamilton working in the Mountain Corridor area.

Activities in coal geology are significantly reduced.

The largest mineral staking rush in Alberta history takes place.

Doug Boisvert (green sweater), Reg Olson (red vest) and the trail guide looking at the geology and taking stream sediment samples along the corridor of Cline River from Abraham Lake to Pinto Lake. This is the last time AGS used horses on field trips (photo from Wylie Hamilton).

1993 Edmonton Beneath Our Feet is published by the Edmonton Geological Society. It is a book to which several AGS staff contributed. The aim of the book is to present geological information about the Edmonton region in a form useful to geologists and engineers and yet understandable by a broad segment of the interested public.

1994 The Geological Atlas of the Western Canada Sedimentary Basin (WCSB) is published. It is the largest and most comprehensive geological atlas produced anywhere in the world for a sedimentary basin.

AGS launches its first Internet site. It initially served information about AGS, a staff list and a list of publications.

ARC Open File Report 1994-08, Regional Metallogenic Evaluation of Alberta, is published.

1995 The AGS is transferred from the ARC to the Alberta Department of Energy and moves to North Petroleum Plaza in downtown Edmonton.

A database is implemented to track AGS publications and sales.

The official review of mineral assessment reports is assumed by the AGS with the move to the Alberta Department of Energy. Dixon Edwards develops a review process, format and protocol for the reports.

Bulletin 62, Industrial Mineral Potential of Alberta Formation Waters, funded by the MDA, is published. The study identifies mineral potential for calcium, magnesium, potassium, bromine and lithium in deep formation waters in Alberta.

1996 Bulletin 63, The Diamond Potential of Alberta is published. The study was funded by the MDA, and was undertaken in response to the discovery of diamonds in kimberlitic diatremes in the Lac de Gras area of the Northwest Territories and the Fort a la Corne area of Saskatchewan.

Bulletin 64, Metallic Mineral Occurrences of the Exposed Precambrian Shield in Northeastern Alberta, is published. This study was an MDA-funded project. A description of 190 metallic mineral occurrences on the exposed Precambrian Shield of northeastern Alberta provides models for mineral deposition, establishes exploration targets and gives insight into the economic potential of the mineral showings.

The AGS is transferred within the Ministry of Energy to the Alberta Energy and Utilities Board at the beginning of the new fiscal year, April 1996. Offices remained at the North Petroleum Plaza until the move to the current location in April 1999.

1998 Diamondiferous kimberlite pipes are discovered in Northern Alberta.

Roy Eccles (in red vest) and Dave Seneshen at the K6 kimberlite, Buffalo Head Hills.

AGS staff begin to provide support and expert advice to applications and hearings in EUB for the development of oil sands resources in the Athabasca and Cold Lake areas.

With support from the Western Economic Partnership Agreement, AGS staff initiate and implement a strong program at AGS in the study of geological storage of CO_2 in Western Canada as a mitigation measure in response to climate change caused by increased levels of CO_2 in the atmosphere. The program continues well into the first decade of the 21st century, and AGS becomes a leader in Canada in this emerging field.

1999 A new Geological Map of Alberta is released at 1:1 000 000 scale. It is available as a hardcopy or on CD.

2000s

2000 Funding was received to study the hydrogeology of the post-Paleozoic succession in the Athabasca Oil Sands area.

Sheila Stewart performing an alkalinity test at the Wiau Springs near the Athabasca River.

Funding was also received for a study of the coalbed methane potential of the province, and also for the potential for Enhanced Coalbed Methane (ECBM) production and associated CO_2 sequestration in coal seams in Alberta.

The AGS joined a collaborative EXTECH IV study on the Athabasca Basin funded by the Geological Survey of Canada (GSC), Saskatchewan Energy and Mines, and industry. It is a multidisciplinary study of metallogeny in the Athabasca Basin. Alberta's contribution enhanced knowledge about the Athabasca sedimentary basin within Alberta and its potential to host important uranium deposits.

The Province commits additional funding for the AGS to increase geological mapping and geoscience studies. The expanded minerals program initially concentrates its efforts in northern Alberta, which has definite mineral potential and will provide information to the mineral industry.

Dianne Goulet doing texture analysis at the AGS lab for the AGS Quaternary projects.

The development of a sand and gravel database is started. It would be completed 4 years later.

Boris Molak working with the Ro-Tap sieve shaker at the AGS lab for grain size analysis on the aggregate projects.

Gordie Jean installing a Still Well for the weir on the Wiau Springs. This is part of a study to determine flow volume from the Empress One Formation.

2001 A new Mississippi Valley Type (MVT) mineral deposit study is undertaken. The project falls under the auspices of the Geological Survey of Canada's Targeted Geoscience Initiative program.

Moberly Member, Middle to Upper Devonian Waterways Formation, east bank of the Athabasca River near Fort MacKay (background).

2002 Alberta Geological Survey staff continue to provide scientific support for EUB decision reports and hearings.

Burning off the produced gas of the flowing well at Peace River so the gas does not escape into the atmosphere.

Tony Lemay and Sheila Stewart taking water samples from the Peace River flowing well.

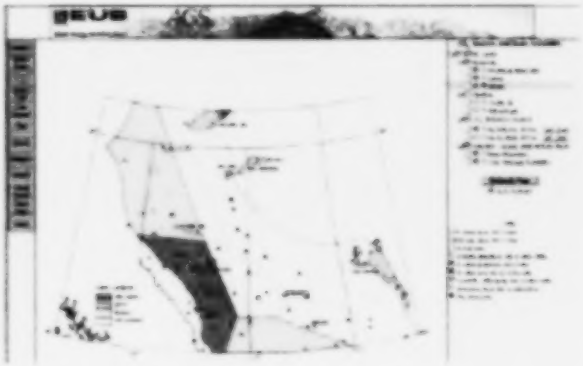
Continuing the program in geological storage of CO_2, AGS initiates a multi-year project in the study of acid-gas injection operations in Alberta and British Columbia as a commercial-scale analogue to future Carbon Capture and Storage (CCS) projects.

2003 AGS staff participate in the preparation of the Geoscape Edmonton poster. The poster was created to illustrate how geology and resources are intertwined with the history of Edmonton and to provide a resource for anyone interested in the natural environment of Edmonton. It is one in a series of currently 16 Geoscape posters for various areas in Canada.

A GIS-based page for browsing and downloading selected GIS data is implemented on the AGS website.

The AGS undertakes a major mapping effort in the Athabasca Oil Sands Area as part of the EUB's Regional Geological Study in support of EUB adjudication of the gas-over-bitumen dispute. This effort contributed to a new understanding of the distribution of gas pools and potentially commercial bitumen accumulations in the Athabasca oil sands region.

AGS launches a web page devoted to the geology and hydrogeology of deep injection and the sequestration of acid and greenhouse gases for the reduction of both H_2S and CO_2 emissions into the atmosphere. It includes an interactive GIS map service that provides information on the suitability for CO_2 storage in Western Canada as well as major CO_2 emission sources.



On April 29th, during the centennial remembrance ceremony for the disastrous Frank Slide, the Province of Alberta committed to implementing a state-of-the-art monitoring system for Turtle Mountain. AGS provides the necessary geological technical expertise for the monitoring system. The objective of the project is to implement a predictive monitoring/early warning system to help mitigate the risk associated with a future rock avalanche from South Peak.

Willem Langenberg and Deborah Spratt (University of Calgary) measuring the orientation of fractures on the summit of Turtle Mountain.

2004 Sand and gravel (aggregate) inventory ends. A final series of 35 maps on the sand and gravel deposits with aggregate potential is released. These are released on CD as colour maps in PDF format.

A joint EUB (Geology and Reserves Group) and AGS oil sands study is begun to map regional units in the Athabasca Oil Sands. The results of this project came out as the Regional Geological Study publication available at the EUB.

A series of Geo-Notes is released providing orthorectified and tiled (to 1:250 000 scale) RADARSAT-1 image coverage and principal component image coverage for all of Alberta north of 55° latitude. They detail the acquisition, characteristics and processing of the RADARSAT-1 images by the AGS.

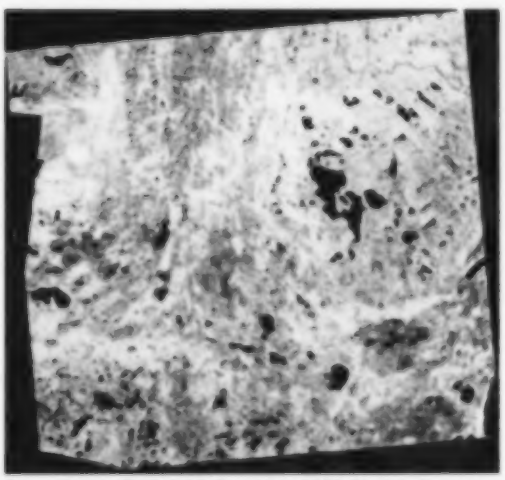


Figure 8 from EUB/AGS Geo-Note 2003-21 showing pseudocolour composite of NTS 84B image dataset of principal component PC1, PC2, PC3 and PC4.

2005 Alberta Geological Survey celebrates its 85th anniversary.

Several surficial, bedrock topography and drift thickness maps are released for parts of northern Alberta. Because of the increased exploration interest in uranium, AGS is conducting a multidisciplinary study of the Alberta portion of the Athabasca Basin and the adjacent crystalline basement in northeastern Alberta.

On the energy side, AGS focuses its efforts on coalbed methane (CBM), groundwater resources in areas of oil sands development, and monitoring the spread of injected CO_2 and acid gas in the subsurface.

The American Association of Petroleum Geologists holds its annual meeting in Calgary in June, and AGS participates with organizing field trips, and thematic and poster sessions on oil sands geology, coalbed methane and CO_2 and acid gas sequestration.

It is the role of the Alberta Geological Survey to provide geoscience information to government, industry and the public to support the exploration, development and conservation of the province's resources for all Albertans. As an organization that generates geoscience data and knowledge about the energy, mineral and groundwater resources of Alberta, AGS has found its home at the Alberta Energy and Utilities Board and is looking forward to the next decades.

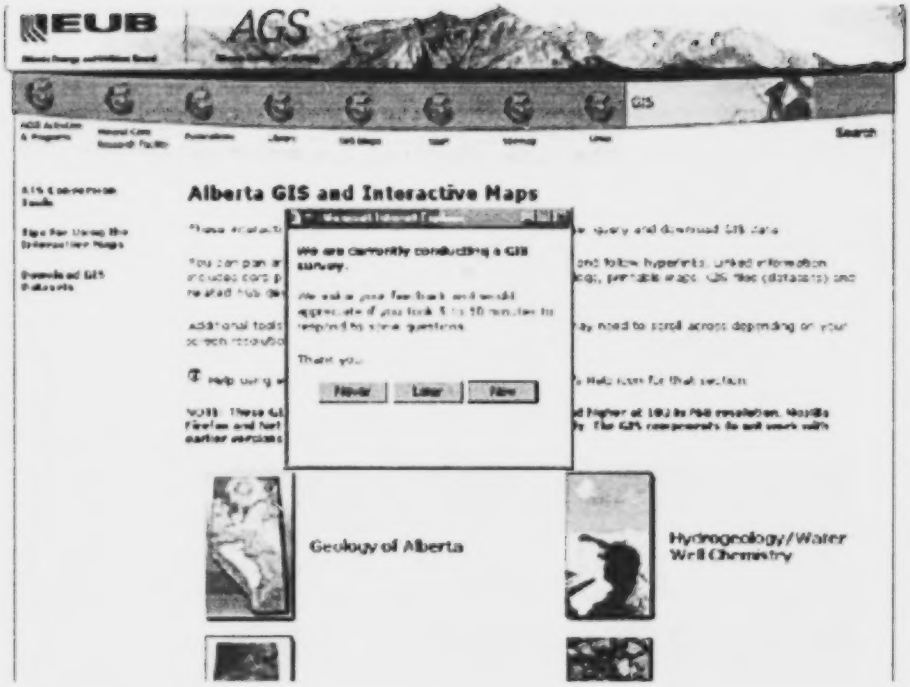
The energy program is delivered by three technical sections: Acid Gas and CO_2 Storage, Groundwater and Geohazards, and Unconventional Gas and Oil Sands.

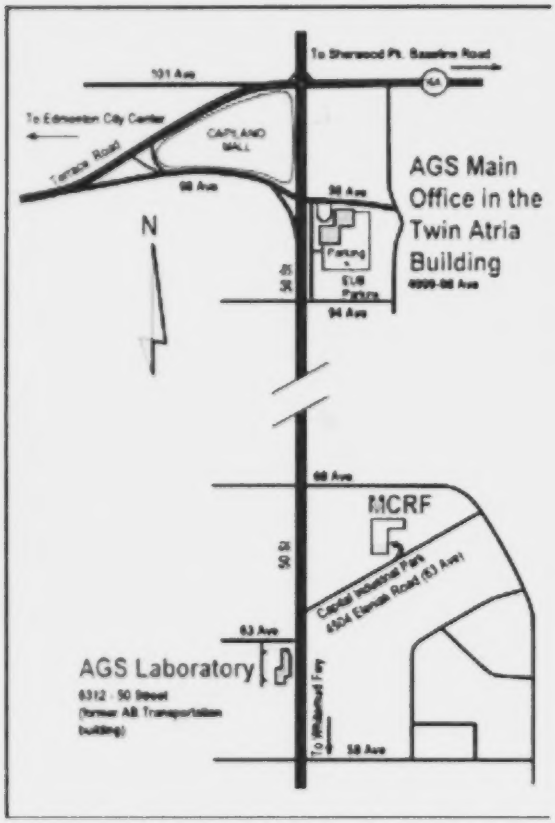
The minerals program has two sections: Northern Mapping and Northern Resource Development. They provide geological mapping at a scale of 1:250 000 or greater, geochemical surveys and thematic mineral studies in selected areas of northern Alberta.

AGS maps, reports and databases are available to industry, government and the public for resource management and economic development. ❖

We are doing a GIS survey to improve our tools and would appreciate your participation.

www.ags.gov.ab.ca/gis





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Our Mineral Core Research Facility (MCRF) is located at

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